Supporting Information

TCMQMS System: A digital twin and blockchain-based platform for tracing the whole process of Chinese medicine quality information

Table of Contents

Table S1. The notation in Chinese medicine quality monitoring system.

Symbol	Definition
Oi	The number of i-th customer order in our system
Pk	The detail information of Chinese medicine of k-th
ui	Traditional Chinese medicine initial code
vi	Randomly generated hashes
Uk	Chinese medicine varieties
Vk	Chinese Medicine Origin
Wk	Chinese medicine transport vehicle number
Xk	Chinese medicine transport temperature
Yk	Handover personnel information
Zk	Drug quality control electronic certificate

Table S2. Traditional Chinese medicine traceability mechanism based on block chain and digital twin, data process code.

```
For\ i=0 sequence to integer; k=0 sequence to integer
    While\ k ! =0
        if(Oi,Pk) ! =0 //System initialization;
            if(ui,vi) ! =0
                if(Uk,Vk,Wk,Xk,Yk,Zk) >0 //defined with integer,data are obtained from the database;
            break
        else Oi = Oi+1
      else Pk = Pk+1
    else Uk,Vk,Wk,Xk,Yk,Zk input from "database"
  End While
    if i!= k
        Displays the details of the Chinese medicine and the reason for the number conflict;
    End if
  End for
```

Table S3. TCMQMS System development and deployment environment

Implementation		
Stage	**Component**	**Description**
Development	IDE	Visual Studio Code
	SIA	1.5.7
	Fabric	2.1.0
	Docker	17.1
	Docker-compose	1.24.0
	Node.js	16.14.0
	Operating system	Windows 10, 64 bits
	Front-end programing language	HTML, CSS, React.js
Configuration and deployment	Customer node	Ubuntu Linux 20.04.4 (64 bits, 4 CPUs, 8 GB RAM, 80 GB SSD ROM)
	Supplyer node	Ubuntu Linux 20.04.4 (64 bits, 4 CPUs, 32 GB RAM, 512 GB SSD ROM)
	Genesis block	Cryptogen is used to generate the genesis block
	Consensus algorithm	PoA(new block is generated every 2 s)
	Golang	Go 1.17.8